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Science and Technology Perspectives

DEVELOPMENTS

EUREKA

(Brazil) Brazil will participate in Eureka through association with a Portuguese technological research group, the Sao Paulo magazine GAZETA MERCANTIL reported. Agreements will be concluded by Brazilian Minister of Science and Technology Renato Archer during his Lisbon meeting in late September with Eduardo Arantes de Oliveira, Portuguese Secretary of State for Scientific Research. (Lisbon DIARIO DE NOTICIAS 22 Aug 86)

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Japanese supercomputer manufacturers sold more than 50 supercomputers during the past year, a sales performance attributed to the development of highly competitive machines.

USSR: Desktop Computer..... Page 6

A recent journal article provides new details on the design and capabilities of the YeS-1840 computer.

USSR: Space Station Program Moves Toward Long-Duration Missions, Orbital Construction..... Page 7

The Soviet space station program will research long-term operations at higher orbits and will further develop the orbital construction techniques successfully tested on Salyut-7.

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PERSPECTIVES selections are based solely on foreign press, books and journals, or radio and television broadcasts. Some of the materials used in this publication will appear as abstracts or translations in FBIS serial reports. Comments and queries regarding this publication may be directed to the Center Chief, to individuals at the numbers listed with items, or to the Science and Technology Center at

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FOR OFFICIAL USE ONLY**DEVELOPMENTS**

DEVELOPMENTS highlights worldwide S&T events reported in the foreign media. Items followed by an asterisk will be published by FBIS. The contributor's name and telephone number are provided.

Airbus

(France) From January to June 1986 Airbus sales decreased 19.2 percent compared to the same period in 1985. The decline is attributed to fewer sales of the A-300 and A-310. The less expensive A-320, however, registered an increase in sales. (Paris LE MONDE 20 Aug 86) [REDACTED]

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(UK/France/FRG) The variable-camber wing for the A-330 and A-340 is now in the definition phase. Engineers at Airbus Industrie and its partner companies expect to complete the design by the end of the year using results of wind tunnel tests done by British Aerospace and MBB. (Paris AIR & COSMOS 30 Aug 86) [REDACTED]

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(France) Aerospatiale has developed a telemetering system for the A-320 permitting real-time analysis of parameters transmitted during flight tests. The system will enable the Toulouse control center to provide new instructions during flight, which will considerably shorten the plane's certification phase. Signals will be received at Saint-Nazaire and retransmitted to Toulouse via PTT networks and the Telecom 1 satellite. The first A-320 flight is scheduled for the spring of 1987. (Paris AGRA Data Base 1 Sep 86)* Antwerp [REDACTED]

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Ariane Military Launch

(ESA/US) Arianespace, the marketing company for the Ariane launcher, has officially confirmed that discussions are under way with the U.S. Air Force to launch Navstar satellites. Arianespace representatives refused to comment on the number of satellites involved or launch dates. Arianespace also has a contract to launch two UK military telecommunications satellites. (Paris AIR & COSMOS 6 Sep 86) [REDACTED]

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ATP Aircraft

(UK/USSR) The new British Aerospace ATP [Advanced Turboprop] commuter, now in flight testing, has received only nine orders from two airlines. Sir Austin Pearce, president of BAe, said negotiations are under way with the USSR for production under license of perhaps 1,000 of the aircraft, including engines and systems. (Paris AIR & COSMOS 23 Aug 86) [REDACTED]

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SIAI

FOR OFFICIAL USE ONLY**Automatic Isochronous Cyclotron**

(Poland) The Nuclear Physics Institute in Krakow has developed an automatic isochronous cyclotron, the AIC 144. The cyclotron is described as being of Polish design, produced entirely from domestic materials, and competitive with similar foreign equipment. It can be used for research and for production of isotopes. Polish experts anticipate that with such cyclotrons Poland will eventually produce isotopes on a commercial scale for medicine and industry. The institute has received an order from the FRG for the AIC 144 and is working with FRG physicists to convert a cyclotron in Karlsruhe to this technology. (Warsaw ZYCIE WARSZAWY 19 Aug 86)*

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STAT**Chip Fabrication Equipment**

(Hungary/GDR) Hungary and the GDR will jointly develop a range of production equipment for microelectronics devices, according to a recently signed agreement. The agreement, which covers the period 1986-90, also provides for more cross-licensing and increased sharing of manufacturing technology. (Budapest NEPSZABADSAG 26 Aug 86)

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European Stealth

(UK/France) The British firm Plessey and the French SNPE (National Company for Powders and Explosives) have formed a joint subsidiary, Marplex, to manufacture antiradar paint. Initial production will provide the French Navy with "anti-Exocet" paint. The French M-4 and ASMP missiles already incorporate stealth technology. (Paris L'USINE NOUVELLE 4 Sep 86)* Antwerp/

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French R&D Budget

(France) The 1987 French budget for nonmilitary research totals Fr 39.106 billion, a 0.6 percent increase over 1986. The budget favors basic scientific and technical research over industrial research: the CNRS [National Scientific Research Center] budget is up 10 percent while electronics sector funding has been halved to Fr 500 million. The overall budget could increase as funds are added for new space programs. (Paris LE MONDE 21 Aug 86; Paris LES ECHOS 20 Aug 86)*

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Microelectronics

(Italy) The Italian Ministry for Scientific and Technological Research has chosen SGS [Societa Generale Semiconduttori] as prime contractor on a \$39 million, 5-year national research program on VLSI circuits. According to the contract, 18 other firms, research centers, and universities will work on the project. The Italian Government is expected to gear similar national research programs to the chemical and steel industries. (Rome CRONACHE DEL GRUPPO STET May 86)*

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Monolithic Integrated Laser

(France) The Bagneux Laboratory of CNET (National Center for Telecommunications Studies) recently achieved the monolithic integration of an AlGaAs-GaAs laser and a control transistor on a single GaAs substrate. Testing has shown that the laser's characteristics are as good as those of similar lasers with separately manufactured components. (Paris LA RECHERCHE Sep 86) Antwerp

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Multi-Launch Rocket System	(US/UK/FRG/France/Italy) Five countries involved in the development of a multi-launch rocket system have created an international consortium named "Multi-Launch Rocket System International Corporation" (MLRS), which will be in charge of the system's worldwide production and marketing. The companies participating in this consortium are: LTV Aerospace and Defense Co. (US), Aerospatiale (France), Hunting Engineering (UK), Diehl (FRG), and SNIA-BPA (Italy). (Paris AGRA Data Base 1 Sep 86) Antwerp/ []	STAT SIAT
Paks Nuclear Plant	(Hungary) On 27 August, a specially programmed robot began inserting 312 uranium fuel rods into the No. 3 reactor of the Paks nuclear power plant. Each six-meter rod contains four meters of fuel. A total of 42 tons of "moderately enriched" uranium will be placed in the reactor, which is scheduled to go on-line in late September. (Budapest NEPSZAVA 28 Aug 86)* []	STAT
	(Hungary) Data collection at the No. 3 and 4 reactor complexes of the Paks nuclear power plant will be performed by microcomputers developed at the Automation Works of the Mechanical Measuring Instruments Factory and at the Central Physics Research Institute (KFKI). The microcomputer system will provide more data handling capacity than the Soviet system operating at Paks' other two reactors. (Budapest ENERGIA ES ATOMTECHNIKA No 7 Jul 86)* []	STAT
Phobos Probe	(Finland/Sweden/USSR) A prototype of the mass spectrometer developed by the Finnish-Swedish research teams at Kiruna for the Soviet Phobos moon project reportedly was delivered to the Soviets on 10 September. The actual equipment to be installed aboard the two probes will be delivered in early 1987. (Stockholm NY TEKNIK 11 Sep 86)* []	STAT
Propfan Aircraft	(FRG/Netherlands/Indonesia) Joint plans are under way to design and produce a new propfan aircraft in the 80- to 110-seat category. The participants are Messerschmitt-Boelkow-Blohm of the FRG, Fokker of the Netherlands, Nurtanio of Indonesia, and Boeing. The aircraft, called the ATRE 90 (Advanced Technology Regional Airliner), is expected to enter service sometime in the mid-1990s. A Fokker spokesman estimates the total development cost at 3 to 4 billion guilders. (Rotterdam NRC HANDELSBLAD 26 Aug 86)* []	STAT
Satellite Antenna	(Italy/Switzerland) Working jointly on an ESA contract, Contraves of Zurich and CSELT/STET of Turin have developed an improved satellite antenna, based on the concept of an inflatable raft, to be used initially on the Quasat satellite. The antenna is 12 meters in diameter, has five illuminators, weighs 15 kilograms or only one-fifth that of a comparable carbon fiber antenna, and can expand to 20 times its predeployed size. Moreover, the antenna can aim and shift each beam among different ground antennas. (Milan TECNOLOGIE ELETTRICHE Jun 86)* []	STAT

FOR OFFICIAL USE ONLY**JAPAN: SUPERCOMPUTERS COMPETITIVE IN PERFORMANCE AND PRICE**

Key Points: Japanese supercomputer manufacturers dramatically increased their sales during the past year owing to the performance and the relatively low price of their popular models. The Japanese will try to further improve processing speeds by developing parallel processing architectures. They hope to increase US sales through their US partners.

Through performance gains and pricing policy, Japanese supercomputer manufacturers have been able to dramatically increase supercomputer sales during the past year. Since entering the supercomputer market three to four years ago, NEC, Hitachi, and Fujitsu, have developed 10 supercomputer models with varied capabilities. Their top-of-the-line machines recorded maximum processing speeds of greater than 1 giga floating point operations per second (GFLOPS), and their popular models demonstrated respectable capabilities of 130-275 mega floating point operations per second (MFLOPS).

During the past year, Japanese companies sold more than 50 supercomputers. NIHON KEIZAI SHIMBUN reported that as of late 1985 Japanese companies had sold or received orders for no more than 10 machines. According to NIHON KEIZAI SHIMBUN on 7 August, Japanese companies have sold or received orders for 64 supercomputers. The Japanese attribute their improved sales to their small-size, low-cost models. These popular models include Fujitsu's VP-50, Hitachi's S-810/5, and NEC's SX-1E. Fujitsu's VP-50 with a maximum processing speed of 140 MFLOPS sells for 1 billion yen and rents for 40 million yen a month. Hitachi's 130 MFLOPS model rents for 40 million yen a month, and NEC's model with the maximum 285 MFLOPS capability rents for 47 million yen a month.

Because of the low price, private firms including medium-sized companies can now use supercomputers for R&D. A NEC executive states in NIKKEI SANGYO SHIMBUN of 7 August that the Japanese market can absorb 100 supercomputers per year for four or five years. Fujitsu officials state that the Japanese market can absorb a total of 3,000 supercomputers.

The Japanese supercomputer manufacturers will continue to develop machines with higher speeds. In December 1985 NEC's SX-2 recorded the then world's fastest processing speed of 1.3 GFLOPS. NEC has since yielded the world record to Cray. According to NIKKEI SANGYO SHIMBUN on 8 August, the Japanese will try to develop parallel processing architectures to achieve higher speed. Toshiba, which dropped out of the competition in general-purpose mainframe computers, will join the race to develop a highspeed parallel processing supercomputer.

With an enhanced cost performance, Japanese manufacturers hope to increase sales in the US market. Fujitsu markets its products through its US partner, Amdahl, and has received orders for 14 units. The press widely reports that NEC will begin a joint venture with Honeywell in September to market NEC supercomputers in the US. NEC reportedly decided to set up the joint venture because the company's first sales effort did not go smoothly when the company sold one supercomputer directly to the Houston Area Research Center. NEC hopes to sell more than 50 supercomputers through the joint venture and to gain a 20 percent market share over the next five years.

The following table identifies Japanese supercomputers, their announced capabilities, and cumulative sales or standing orders. It was compiled from data in the 15 April 1985 NIHON KOGYO SHIMBUN, the May 1985 issue of KAGAKU ASAHI, NIHON KOGYO SHIMBUN of 23 October 1985, and NIKKEI SANGYO SHIMBUN of 7 August:

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Supercomputer	Maker	Date of Announcement	Maximum Processing Speed	Cumulative Sales or Orders (MFLOPS)
S-810/10	Hitachi	Aug 82	315	
S-810/20	Hitachi	Aug 82	630	13
S-810/5	Hitachi	Sep 85	130	
VP-100	Fujitsu	Jul 83	250	
VP-200	Fujitsu	Jul 83	500	44
VP-50	Fujitsu	Apr 85	140	
VP-400	Fujitsu	Apr 85	1,140	
SX-1	NEC	Apr 83	570	
SX-2	NEC	Apr 83	1,130	7
SX-1E	NEC	Oct 85	285	

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USSR: DESKTOP COMPUTER

Key Points: A desktop computer, the YeS 1840, developed at the Minsk Scientific Research Institute is designed as a personal professional computer (PPEVM) for use in scientific research and industrial applications. The computer is configured for building local networks and for easy interface with larger systems. It is rated high on reliability with an average operating life of 2000 hours between repairs.

In late 1985 the Minsk Scientific-Research Institute of Computers announced the development of the YeS-1840, a desktop personal professional computer, which was recommended by the State Commission under Ye. P. Velikhov for series production because of its reportedly superior quality. (For initial reporting on this computer, see "USSR: New Mini YeS-1840 Computer," FB-PN 86-020).

The YeS-1840 is the latest computer to evolve from a generation of microcomputers that include the SM-1800, Iskra-226, Agat, and SM-1810, according to an article in NARODNOYE KHOZYAYSTVO BELORUSSII No 5, 1986 by a YeS designer, A.P. Zapolskiy. The desktop Yes-1840 is of modular design and consists of five units. The basic module contains the logic unit and processor, capable of 1 million operations per second, with an internal memory storage of 1 megabyte. The basic module can be directly connected to production processes, scientific experiments, and control systems. Moreover, it is designed to interface with computer networks and supercomputer systems. The dimensions of the basic module are 450x380x145 mm. The keyboard contains 90 keys divided into alphanumeric and program-functional fields, with the alphanumeric keys arranged in the order of a standard typewriter. It has both Cyrillic and Latin fonts. Keyboard dimensions are 486x190x430 mm. The external memory module stores data on flexible magnetic disks/diskettes that hold up to 320,000 bytes of data. The memory module's dimensions are 450x300x119 mm.

The display module is a single-color screen with a 31-cm-wide diagonal and a 25-line, 80-character display. Future plans call for the alphanumeric display to be upgraded by improved graphics with 16 levels of brightness. A color graphic display will be available next year. The printing module can accommodate alphanumeric and graphic information with 96 to 132 characters per line at 100 characters per second.

The system software includes an operating system, a set of service programs to ensure operation with information carriers (diskettes), immediate correction and adjustment for specific operations, BASIC programming language, and a package of applied ABAK programs for processing tables. Plans call for additional applied program packages, and other programming languages and operating systems. The YeS-1840 is considered a reliable performer with an average service life of not less than 2000 hours and requires no special service personnel.



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USSR: SPACE STATION PROGRAM MOVES TOWARD LONG-DURATION MISSIONS, ORBITAL CONSTRUCTION

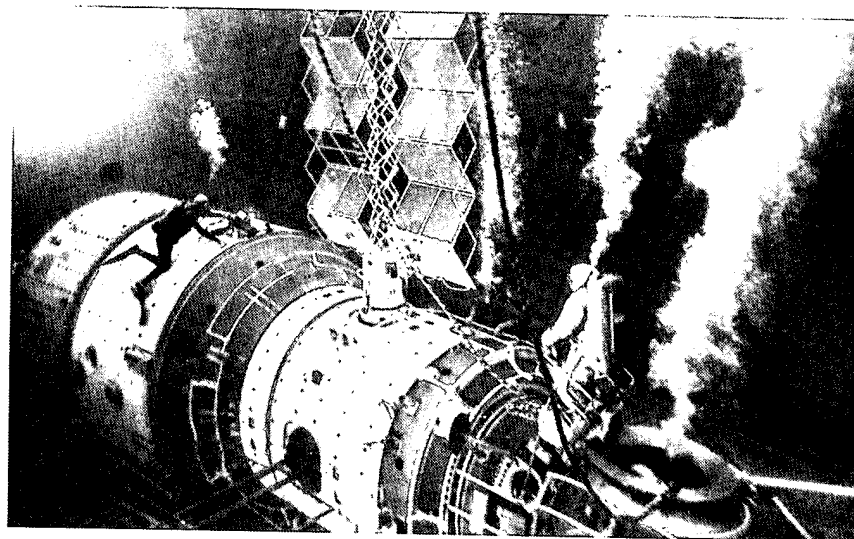
Key Points: Recent media commentaries on the Soviet space station program have announced the completion of the Salyut program and indicate a new concentration on long-duration station operations in higher orbits and development of new methods for orbital construction.

On 16 August TASS announced that the program of cosmonaut activity on the Salyut-7 station had been completed and that the station would be moved to a higher orbit. On 22 August, Salyut-7, still docked with the Cosmos-1686 module, was boosted to an orbit with an average altitude of 480 kilometers — approximately 150 kilometers higher than the usual station orbit.

An article by Yu. Semenov in the 8 September issue of PRAVDA summarizes the results achieved in the Salyut-7 program and states that the purpose of placing the station in the new orbit is to obtain data on longevity of station components and on environmental conditions at the higher orbital range at which future Soviet space stations will operate. According to Semenov, space technology is “on the threshold” of permanently operating manned orbital stations whose service life will be decades long and whose dimensions will be several tens of meters. Semenov points out that stations of such size and planned service life will have to operate at orbits of about 500 kilometers.

According to Semenov, the Salyut-7/Cosmos-1686 complex should remain in orbit for at least eight years. Service life of station elements will be monitored by radio telemetry. Semenov states that after several years, when the station's radio systems have ceased operating, a cosmonaut inspection team may be sent to rendezvous with the station and bring back some of its components for further study. In an unusually phrased concluding sentence Semenov states that upon completion of this research program “a return of the station to a predetermined region of the Earth will be organized.” The flights of previous Salyut stations have been terminated by deorbit and destructive reentry in the atmosphere.

In the 16 August issue of PRAVDA Semenov discussed the significance of the girder deployments performed during EVAs by cosmonauts Kizim and Solovyev on 28 and 31 May. The article was coauthored by B. Paton, director of the Institute of Electric Welding of the Ukrainian Academy of Sciences. Paton's institute developed both the URS (girder deployment/recovery device) used in the girder deployment and the URI (multipurpose manual tool) welding device, an improved version of which was tested during the same experiment. Semenov and Paton characterize the successful girder



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deployment as the forerunner of construction techniques for future orbital complexes. They state that the "hinged-lever" type of girder can serve as the basic structural element for large solar panels with areas tens of times larger than present panels, while the URS deployment apparatus represents the prototype of automata which will deploy girder structures in space up to several hundred meters long. They also point out that the URI tool could be used as the working organ of robot welders for assembling various types of structures in orbit.

Semenov and Paton conclude that the next logical step will be the creation of a "construction site" on the Mir station for development of assembly and service operations for large structures of various sizes and designs in actual flight conditions.

A possible near-term development in the Mir station program was indicated recently by the French aerospace journal AIR & COSMOS. The 30 August issue carries a photo released by TASS during the July visit of President Mitterand to Zvezdnyy Gorodok, the cosmonaut training center near Moscow. The photo shows a full size mockup of the Mir station in a water tank. A third solar panel has been attached to the station's central compartment perpendicular to the two main lateral panels. Apparently, the supplementary panel has been deployed from a small cylindrical container similar to the URS device used in the Salyut-7 girder deployment.



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FOR OFFICIAL USE ONLY**REPORTS**

REPORTS surveys science and technology trends as detailed in articles, books, and journals. It also includes summaries and listings of articles and books which may serve as potential sources for future research. Conference proceedings will also be occasionally presented in this section.

FRG: RESEARCH STRATEGIES THROUGH THE YEAR 2000

Long-term research strategies for space, materials science, biotechnology, and information technology in the FRG are mapped out in recent reports by the Society for Foreign Policy, the Federal Research and Technology Ministry (BMFT), and the Association for Large-Scale Research (AGF). The reports urge the implementation of technology policies that will set the pace for West European advances through the year 2000. The success of these policies hinges on increased funding and joint ventures with the FRG's European partners and the United States. Moreover, improved means of transferring technology between research and industry is viewed as indispensable to ensuring FRG competitiveness.

Space

The Society for Foreign Policy advocates that the FRG and West Europe assume a major role in the exploration of space in order to maintain their competitive stature in the commercialization of space. In its 1986 report entitled "German Space Policy at the Turn of the Century," the group urges the FRG to shoulder 30 percent of the financing for Hermes. Moreover, it recommends a substantial increase in public funds for the national space program and expansion of West German space R&D. The society also proposes West European participation in both a European and an international space station; modernization of the European launcher Ariane; the development of a new generation of space transportation systems based on "scramjet" technology; a European satellite for verification of arms control agreements; and cooperation with the United States.

Materials Science

The promotion of joint projects involving industry and research centers and the strengthening of German industrial competitiveness are the main objectives of a 10-year BMFT subsidy program for materials research. Long-term research goals are outlined in the BMFT's 1985 report "Materials Research: Program of the BMFT." Scheduled to run through 1994, the program will study ceramics, high temperature metallic and specialized materials, powder metallurgy, new polymers, and composites. Participating research institutes include the DFVLR (German Research and Development Institute for Air and Space Travel) and KFA (Julich Nuclear Research Center), studying lightweight and high temperature materials; KFA and KFK (Karlsruhe Nuclear Research Center), examining ceramic and metallic materials; and the GKSS (Research Association for the Use of Atomic Energy in Ship Construction and Propulsion), researching the breaking behavior of metallic materials. Other government agencies and institutes involved in the BMFT's program are the Federal Defense Ministry, which offers grants to study new dual-use materials; the Max Planck Society, which budgets DM 60 million annually to research powder metallurgy, special ceramics, and nonmetallic crystalline materials; and the Volkswagen Endowment, which studies unconventional materials and microstructures.

The BMFT has allocated DM 1.1 billion through 1994 for its materials research program. Funding for the first four years rises from DM79 million in 1985 to DM119 million in 1988. BMFT funds support individual and joint research projects as well as personnel and information exchange among research institutes and industry. Projects conducted jointly by institutes and industry receive 50 percent of their funding from the BMFT and 50 percent from the commercial partner.

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The FRG's long-term materials research plans are further developed in the AGF's 1985 report "The Thematic Orientation of Large-Scale Research in the 1980s and 1990s." The AGF is a group of 13 major FRG research institutes formed to coordinate research through the year 2000. AGF materials science research will concentrate on matrix materials for the solidification of radioactive waste; structural material for the so-called "first wall" of fusion reactors; materials for highly efficient photovoltaic cells; ceramic materials for automobile engines; and materials for rapid mass memories. Current AGF materials research includes powder metallurgy, ion implantation, and superfast cooling.

Biotechnology

International competition will drive FRG research in enzyme and genetic engineering, according to the AGF report. Furthermore, industry will focus on the commercial development of new host-vector systems for the expression of genes in higher cells. Other areas of intensified research will be the improved efficiency and expanded application of enzymes as well as cofactor regeneration and biocatalysis.

Information Technology

The AGF report observes that intense international competition will provide an impetus for large-scale FRG research in applied information technologies. VLSI design, materials preparation and characterization, and the interpretation of defects using microscopic analysis will top the list of research interests.

The AGF report also notes a current project to develop a PROLOG inference engine and a computer structure for superfast numerical methods. The report calls for long-term programs in supercomputer architectures and software (parallel algorithms) — areas in which FRG research institutes could play a pioneering role in the second half of the 1990s.



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FOR OFFICIAL USE ONLY**USSR: LASER PIONEER CITES ACHIEVEMENTS,
PROBLEMS IN BASIC RESEARCH**

Nobel laureate Aleksandr Mikhailovich Prokhorov, director of the Department of General Physics and Astronomy of the USSR Academy of Sciences, claims that the greatest achievements in science are rooted in pure research. In a PRAVDA article on 9 July he attributes to basic research the recent revolutionary advances in physics. Basic research has generated improvements in food and energy programs, has prompted the development of such industrial products as nearly perfect artificial diamonds and heat-resistant materials, and has increased the durability of machine components by a factor of 10 in some cases. During the current five-year plan a blending of mechanical, electrical, magnetic, and corrosion-resistant properties in amorphous and microcrystalline alloys has lowered tenfold the loss of electrical energy in transformers. The same alloys have increased the service life of magnetic recorder heads by the same factor.

Prokhorov observes that because of the explosion in physics research, 20 new laboratories have been built since 1981 and assigned to various departments of the Academy experiencing an expansion of research activities. The trend toward acceleration will require more joint research between the physics institutes of the Academy and the research institutes of universities and government ministries. Prokhorov, a main contributor to the invention of the laser, declares that accelerated development of new applications for lasers is the most important task for Soviet physics research. He announces that his department is on the verge of a breakthrough in the creation of a new generation of solid state lasers without rival outside the USSR. The second important task on Prokhorov's list is the development of fiber optic communications.

Although he praises the accomplishments of physics research institutes, Prokhorov points out serious problems in basic research and offers some solutions. He contends that the present scale and quality of basic research is inadequate to meet national needs. Physics research is poorly financed and modern equipment, including computers, is lacking. Funds should be allocated in the budget to meet the urgent need for a special design bureau to serve the physics institutes. Moreover, physicists require properly designed equipment to test the findings of their research.

Work in the institutes is poorly organized and the lines of communication among the various units are blocked. Prokhorov argues that the respective responsibilities and the rights of the departments, institutes, subdivisions, groups, branch offices, and science centers must be clearly defined; otherwise, duplication and superfluous paperwork will continue to obstruct the implementation of research results. The preeminent role of the department must be restored. Departments were intended to be the structural foundations of the Academy. They must reassert control over research trends in the USSR, including the direction of research in academic institutions. This function is appropriate for the departments, in Prokhorov's view, because top specialists work at the departmental level of the USSR Academy of Sciences.

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FOR OFFICIAL USE ONLY**USSR: STUDIES OF SOLAR RADIATION NEAR THE SEA SURFACE**

Recent Soviet scientific journals have published several papers on aspects of solar radiation near the sea surface. Some of these articles are described in brief below.

The January-February 1986 issue of *MORSKOY GIDROFIZICHESKIY ZHURNAL* includes "An Analysis of the Structure of Sea Surface Photoimages Near Sun Glitter." This paper contains a study of the space-time structure of the surface manifestations of internal waves in a sea surface brightness field near sun glitter. Using digital representation of surface images obtained in an aerial survey of the Black Sea, the study considers the factors of direct solar radiation, radiation scattered into the atmosphere, and the effect of the "spreading" of packets of brightness contrasts.

The March-April *MORSKOY GIDROFIZICHESKY ZHURNAL* contains "The Possibility of Registering Internal Waves by Measuring the Spectral Composition of Radiation Rising From the Sea" and "A Study of the Effect of Sea Surface Roughness on the Intensity of Ascending IR-Radiation." The first article asserts that changes in radiation spectral composition depend on vertical shears in chlorophyll-laden layers which act as selective diffusive-scattering screens. Since these changes are the result of internal waves, they provide a potential means for wave detection by remote means. The second paper presents an experimental formula for the dependence of radiation intensity on near-surface wind velocity. The measurements of ascending radiation and sea surface which support this formula were obtained in various climatic zones.

The December 1985 issue of *IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA* contains "The Polarization of Ascending Radiation in the 0.8-2.2 Micrometer Spectrum." Although this article addresses ascending radiation from the earth and from water clouds, it also reports that the maximum amount of polarization for radiation reflected from water in a "solar path" is 90 to 95 percent. This was measured by an IF-73 polarimeter in a laboratory aboard an IL-18 aircraft. The journal's August 1986 issue includes "Optical Wave Scattering by the Sea Surface." This article classifies scattering regimes and analyzes the information content of signal intensity fluctuation characteristics relative to the surface parameters for various regimes.

The same journal carried two papers on this topic in its July 1986 edition. "Research on the Backscatter Coefficient of Optical Radiation From a Sea Surface With a Varying Gradient" provides the statistical analysis of a great deal of data on the Atlantic, Pacific and Indian Oceans gathered by the scientific research vessel Akademik A. N. Nesmeyanov. The measurements were performed under various meteorological conditions by an L-1M two-wave lidar on nearly tangential paths. The second paper, "Determining Sea Water Absorbtivity by Ascending Radiation Spectra," explores the relationship between the absorption index and the effective length of radiation waves ascending from a water layer. The data for this article were obtained by the scientific research vessel Akademik Vernadskiy.

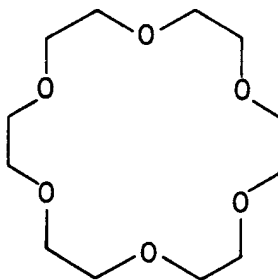


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FOR OFFICIAL USE ONLY**USSR: BLOOD-BRAIN BARRIER PENETRATED BY CROWN ETHER**

The August 1986 issue of *KHIMIYA I ZHIZN* reports the development of a "hybrid" medicinal preparation by researchers at the Physicochemical Institute imeni A. V. Bogatskiy, Ukrainian SSR Academy of Sciences. By acting directly on brain receptors, this preparation improves thought processes, memory, and learning. The use of crown ethers in developing such preparations enables physiologically active compounds to be "pulled through" natural barriers of the body, in particular, the blood-brain barrier. The new preparation is much more effective than the current nootropic (affecting higher brain functions) preparation, piracetam. It is currently undergoing preclinical testing.

Crown ethers are macrocyclic polyether compounds which can form complexes with metallic, inorganic, or organic ions as well as with neutral organic compounds. These macrocyclic ethers are membranotropic and can alter the electric potential sensitivity and permeability of excitable membranes. Their mechanism of action may be similar to that of valinomycin, a cyclic polypeptide antibiotic which entraps potassium ions and pulls them through the cell membrane by forming an ion "channel" in the membrane



Example of a Crown Ether (18-crown-6)



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POLAND: DECISION TO DELAY NUCLEAR PLANT CONSTRUCTION

The Chernobyl accident has prompted the Polish Government to temporarily halt construction of its first nuclear power plant. The decision to stop work on the Zarnowiec facility near Gdansk comes despite an official drive to modernize the country's energy sector.

The government's move reverses an earlier pledge to proceed with the Zarnowiec facility despite the Chernobyl accident. (Polish press reports immediately after the Chernobyl incident reflected Warsaw's determination to continue nuclear plant construction. For coverage of this issue, see SCIENCE AND TECHNOLOGY PERSPECTIVES, 26 August 1986, Vol. 1, No. 7 p 8.) The Gdansk area Party paper GLOS WYBRZEZA (as quoted by Paris AFP on 2 September) reported that the work stoppage, which will last "several months," is directly attributable to the Chernobyl accident and will delay completion of the 1,860-megawatt plant beyond the scheduled 1990 on-line date. The paper notes that Polish experts, who have become "very meticulous" about safety standards, have refused to use inferior quality Polish cement to sheath the reinforcement bars at the reactor's base. As a result, the bars, which have remained exposed to months of rain, are rusting and may have to be replaced.

GLOS WYBRZEZA comments that a lack of foreign exchange prevents importing the "special cement" needed to cover the bars. Moreover, the paper reports that Polish manufacturers will not guarantee the quality of the steel and electrical cable being used at Zarnowiec.

The construction delay, according to a 28 August Warsaw PAP report, comes as Poland is trying to modernize its energy industry by eliminating outmoded facilities and building new ones. A conventional power plant is being built at Belchatow (scheduled for completion in 1990 with a 4,130-megawatt capacity); two other facilities are planned for Opole (with a 2,160-megawatt capacity) and Mloty (with a 750-megawatt capacity). A second nuclear plant with a 4,000-megawatt capacity had been planned near Klempicz, but a timetable for its construction is unavailable.



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PREVIEWS

PREVIEWS is an annotated list of selected science and technology items being translated by FBIS. The list may also contain previously published items of wide consumer interest.

EUROPE REPORT: SCIENCE AND TECHNOLOGY

EUREKA PROJECT 'PROMETHEUS' SEEKS COMPUTER-AIDED AUTO WITH AI

Article details the companies and funds involved in "Prometheus," a Eureka project to develop a completely computer-driven automobile with special artificial intelligence, computer, and telecommunications systems. (Rijswijk PT AKTUEEL 13 Aug 86 p 7)

FRG LASER PRODUCERS, PROJECTS, FUNDS

Fundamental laser research is being conducted at the Max Planck Institute for Quantum Optics and at universities in West Berlin and Hanover. The DFVLR (German Research and Development Institute for Air and Space Travel) Institute for High Energy Processes is doing applied laser research. Article details laser research funds and projects at these institutes. (Rijswijk PT AKTUEEL 13 Aug 86 p 17)

CNET PILOT WORKSHOP DEVELOPS FRENCH 1-MICRON CMOS TECHNOLOGY

The CNET's pilot workshop for producing advanced CMOS integrated circuits is an effort to help France "catch up" in microelectronics technology. Personnel, production, and clean room facilities are detailed. (Paris L' ECHO DES RECHERCHES No 122, Fourth Quarter 1985 pp 5-14)

OLIVETTI: CORPORATE ACTIVITIES, RESULTS FOR 1985

Olivetti had a successful year in 1985. This extensive article details Olivetti's balance sheet, new areas of research, and joint ventures with international corporations. (Ivrea NOTIZIE OLIVETTI Jun 1986 pp 2-7)

SAENGER 2, HOTOL COMPETE AS SUCCESSORS TO HERMES

Presented for the first time at Farnborough 86, the aerospace planes are expected to reduce the cost of space transport to roughly one-fifth that of the shuttle. Hotol is slated to fly by 1999, Saenger between 2004-2008. Preliminary specifications are given. (Paris AIR & COSMOS 6 Sep 86 p 46)

AIRBUS INDUSTRIE MANAGING DIRECTOR ON CURRENT ISSUES

Issues addressed include orders, the fly-by-wire system of the A-320, the McDonnell Douglas talks, rumors of British withdrawal, possible customers for the new A-340, and provisional launch time for the new program. (Paris AIR & COSMOS 6 Sep 86 pp 26,60)

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